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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
08/558,544	11/16/1995	SHUNPEI YAMAZAKI	0756-1441	3919

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EXAMINER
KANG, DONGHEE

ART UNIT	PAPER NUMBER
2811	

DATE MAILED: 03/17/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	08/558,544	YAMAZAKI, SHUNPEI	
	Examiner	Art Unit	
	Donghee Kang	2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 February 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-59* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *1-4,6,14-18,20,23-28,36-39,44,47,51,54,57 and 59* is/are allowed.

6)☒ Claim(s) *5,8,9,11-13,19,22,29-32,34,35,40,48-50,52,53,55,56 and 58* is/are rejected.

7)☒ Claim(s) *7,10,21,33,38,41-43,and 45-46* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Acknowledgment

1. Applicant's Amendment and Response to Paper No.39 has been entered and made of Record.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims **8,19, 22, 29, 30, 48, 49, 52, 53 & 55** are rejected under 35 U.S.C. 103(a) as being unpatentable over Koji (JP 2,143,572) in view of Morozumi (US 4,862,237).

Regarding claim **19**, Koji discloses a device for sensing a light comprising (Fgi.3G):

a semiconductor layer (2) over an insulating substrate (1); a photoelectric conversion semiconductor device on said substrate, a semiconductor region of the photoelectric conversion semiconductor device comprising a p-type impurity (201) semiconductor region, an intrinsic semiconductor region (2-2), and an n-type impurity semiconductor region (2-3); and a thin film transistor over the substrate, an active layer of the thin film transistor comprising a source region, a drain region, and a channel region;

wherein said semiconductor regions are arranged in order with said p-type impurity semiconductor region adjacent said intrinsic semiconductor region and said

intrinsic semiconductor region adjacent said n-type impurity semiconductor region in said photoelectric conversion semiconductor device, said order being in a direction perpendicular to that in which a light to be sensed is incident thereon, and wherein the semiconductor region of the potoelectric conversion semiconductor device and the active layer of the thin film transistor comprise the same semiconductor layer.

Although the device of Koji was not fabricated by same process step as claimed invention, the resultant structure of the process steps in claims are anticipated by Koji.

The product-by-process claims are given no patentable weight. "Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production.

If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process". In re Thorpe, 777F. 2d 695,698 USPQ 964, 966 (Fed. Cir.1985). See also MPEP 2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claim in "product by process" claim or not.

Koji does not teach forming SiO_2 layer on the insulating substrate. However, Morozumi in Fig.4 teaches forming a TFT and light sensor on the insulating substrate (20) covered over entire are of its surface with a SiO2 (21). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to

substitute the insulating substrate of Koji with the insulating substrate covered with silicon oxide as taught by Morozumi in order to improve the signal to noise ratio.

Regarding claims **8, 22, 29 & 30**, Koji discloses a device for sensing a light comprising (Fig.3G):

a light sensor region and a semiconductor switch region (TFT) adjacent to and operatively connected with said light sensor region over an insulating substrate, wherein a semiconductor region of the light sensor region and an active region of the semiconductor switch region comprising the same semiconductor layer formed on the insulating substrate. Koji does not teach forming SiO_2 layer on the insulating substrate.

However, Monozumi teaches forming a TFT and light sensor on the insulating substrate (20) covered entire area of its surface with silicon oxide film (21). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the insulating substrate of Koji with the insulating substrate covered with silicon oxide as taught by Morozumi in order to improve the signal to noise ratio.

Neither Koji nor Monozumi teaches the semiconductor layer has at least one of an electron mobility in a range of 15 to 300 cm^2/Vsec and a hole mobility in a rang of 10 to 200 cm^2/Vsec. However, a desired the electron mobility and hole mobility can be achieved by varying n and p type dopant concentration. Therefore, it would have been obvious in the art at the time the invention was made to obtain the electron mobility in a range of 15 to 300 cm^2/Vsec and hole mobility in a rang of 10 to 200 cm^2/Vsec by changing n and/or p type dopant concentration in the device in order to obtain a desired spped of the device.

Regarding claims **48,49,52,53 & 55**, Koji as modified by Morozumi teaches the light sensor device uses in the electric equipment, such as a facsimile machine and image sensor.

4. Claims **5, 9,11-13, 31, 32, 34-35, 40, 48, 50, 56 & 58** are rejected under 35 U.S.C. 103(a) as being unpatentable over Koji in view of Morozumi and further in view of Misawa et al. (US 5,250,931).

Regarding claim **5**, Koji discloses a device for sensing a light comprising (Fgi.3G):

a semiconductor layer (2) over an insulating substrate (1); a photoelectric conversion semiconductor device on said substrate, a semiconductor region of the photoelectric conversion semiconductor device comprising a p-type impurity (201) semiconductor region, an intrinsic semiconductor region (2-2), and an n-type impurity semiconductor region (2-3); and a thin film transistor over the substrate, an active layer of the thin film transistor comprising a source region, a drain region, and a channel region;

wherein said semiconductor regions are arranged in order with said p-type impurity semiconductor region adjacent said intrinsic semiconductor region and said intrinsic semiconductor region adjacent said n-type impurity semiconductor region in said photoelectric conversion semiconductor device, said order being in a direction perpendicular to that in which a light to be sensed is incident thereon, and wherein the

semiconductor region of the potoelectric conversion semiconductor device and the active layer of the thin film transistor comprise the same semiconductor layer.

Although the device of Koji was not fabricated by same process step as claimed invention, the resultant structure of the process steps in claims are anticipated by Koji.

The product-by-process claims are given no patentable weight. "Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production.

Koji does not teach forming SiO_2 layer on the insulating substrate. However, Morozumi in Fig.4 teaches forming a TFT and light sensor on the insulating substrate (20) covered over entire are of its surface with a SiO2 (21). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the insulating substrate of Koji with the insulating substrate covered with silicon oxide as taught by Morozumi in order to improve the signal to noise ratio.

Neither Koji nor Morozumi teaches the semiconductor switch comprises complementary p-channel and n-channel thin film transistor. However, Misawa et al. teach in Fig.4D the driver circuit portion comprises p-channel and n-channel thin film transistors (132 & 133). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of Misawa with Koji as modified by Morozumi, since the complementary p-channel and n-channel thin film transistors requires a small power to operate the device. Such modification provides Koji's device with lower power consumption.

Regarding claims **9 & 11-12**, Koji teaches a semiconductor device comprising (Fig.3G):

a light sensor region and a semiconductor switch region (TFT) adjacent to and operative connected with said light sensor region over an insulating substrate, wherein a semiconductor region of the light sensor region and an active region of the semiconductor switch region comprise the same semiconductor layer (polycrystalline Si) formed on the insulating substrate, wherein a Raman spectrum of the semiconductor layer (polycrystalline Si) exhibits a peak deviated from that which stands for a single crystal for the semiconductor,

wherein said light sensor region comprises at least two semiconductor regions having different electrical properties and forming a junction,

wherein said two semiconductor regions in said light sensor region are arranged in a lateral direction on said substrate.

Koji does not teach forming a SiO_2 layer on the insulating substrate. However, Morozumi in Fig.4 teaches forming a TFT and light sensor on the insulating substrate (20) covered over entire are of its surface with a SiO_2 (21). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the insulating substrate of Koji with the insulating substrate covered with silicon oxide as taught by Morozumi in order to improve the signal to noise ratio. Neither Koji nor Morozumi teaches the semiconductor switch comprises complementary p-channel and n-channel thin film transistor. However, Misawa et al. teach in Fig.4D the driver circuit portion comprises p-channel and n-channel thin film transistors (132 &

133). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of Misawa with Koji as modified by Morozumi, since the complementary p-channel and n-channel thin film transistors requires a small power to operate the device. Such modification provides Koji's device with lower power consumption.

Regarding claim **13**, cited prior arts do not teach the semiconductor layer has at least one of an electron mobility in a range of 15 to 300 cm^2/Vsec and a hole mobility in a rang of 10 to 200 cm^2/Vsec. However, the electron mobility and hole mobility can be varied with changing n and p type dopant concentration in the semiconductor layer to obtain a desired device. Therefore, it would have been obvious in the art at the time the invention was made to vary the electron mobility and hole mobility in the device in order to obtain a desired speed of the device.

Regarding claims **31-32 & 58**, Koji teaches a semiconductor device comprising (Fig.3G):

an insulating substrate, first and second islands on said substrate; p-type impurity region in said first semiconductor island with a first channel region interposed therebetween and in a first region of said third semiconductor island; an insulating film (4) on said first and second semiconductor islands; a gate electrode (2-1) over said first channel regions with said insulating film interposed therebetween,

wherein a Raman spectrum of each of said first and second semiconductor islands exhibits a peak deviated from that which stands for single crystal of the semiconductor. Koji does not teach forming SiO_2 layer on the insulating substrate.

However, Monozumi teaches forming a TFT and light sensor on the insulating substrate (20) covered entire area of its surface with silicon oxide film (21). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the insulating substrate of Koji with the insulating substrate covered with silicon oxide as taught by Morozumi in order to improve the signal to noise ratio.

Neither Koji nor Morozumi teaches the semiconductor switch comprises complementary p-channel and n-channel thin film transistor. However, Misawa et al. teach in Fig.4D the driver circuit portion comprises p-channel and n-channel thin film transistors (132 & 133). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of Misawa with Koji as modified by Morozumi, since the complementary p-channel and n-channel thin film transistors requires a small power to operate the device. Such modification provides Koji's device with lower power consumption.

Regarding claims **34-35 & 40**, cited prior arts do not teach p-type impurity regions contains boron and n-type impurity regions contains phosphorous. However, it is conventional to use boron when p-type implants are required and phosphorous when n-type implants are required. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use boron for p-type and phosphorous for n-type since they are known materials well suited for intended purpose.

Regarding claims **48, 50 & 56**, Koji teaches the light sensor device uses in the electric equipment, such as a facsimile machine and image sensor.

Allowable Subject Matter

5. Claims **1-4, 6,14-18, 20-28,36-39, 44,47,51,54,57 & 59** are allowed in the previous office action.

6. Claims **7, 10, 21, 33, 38, 41, 42, 45, 4, & 47** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

7. Applicant's arguments filed 25 February 2003 have been fully considered but they are not persuasive. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, forming oxide layer on the insulating substrate will reduce noise hence improving the signal to noise ratio as taught by Morozumi. With respect to combine the teaching of Morozumi with the Koji's device, the noise will be reduce so as to improve the signal to noise ratio in Koji's device.

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Donghee Kang whose telephone number is 703-305-9147. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 703-308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

dhk
March 11, 2003

Steve Loke